acquaintance with the subject is ensured. There is, perhaps, no department of farming which suffers so much from mismanagement as the poultry yard, yet the industry is of national importance. Mr. Watson reminds his readers that the annual value of farm poultry and eggs produced in the United States, according to the census returns of 1890, exceeded the annual value of the coal, iron, and mineral oil produced during the same period. In England we have no such statistics, but the Trade and Navigation Returns show that the imports of poultry and eggs to this country amounted last year to the value of 6,416,468*l*. The book has numerous illustrations.

R. W.

The Collected Scientific Papers of John Couch Adams. Vol. ii. Pp. xxxii+646. (Cambridge University Press, 1900.)

THE astronomical papers in this volume have been ably edited by Prof. Sampson. The first eighteen papers form a connected series on the lunar theory, and are substantially the lectures on that subject which Adams used to deliver at Cambridge. As an aid to the student they probably surpass any text-book that has been written on the subject. It has been said that the difficulties of the lunar theory begin where the text-books usually leave off, but Adams introduces the reader to many of the practical difficulties of the numerical work, such as the slow convergence and small denominators.

The other astronomical papers are miscellaneous in character and must have taxed the editor to the utmost, for, to quote the preface, "the papers . . . were almost devoid of arrangement. . . . It would have been a hopeless task . . . had not almost every page been dated. This permitted reference to a diary. . . ." Among the most interesting papers are those on Jupiter's satellites, a subject which Prof. Sampson has made his own, a paper on an infinite determinant in the motion of the moon's node which shows that Adams came nearer than anyone else to anticipating Hill in his treatment of the lunar theory, and some papers on the moon's secular acceleration.

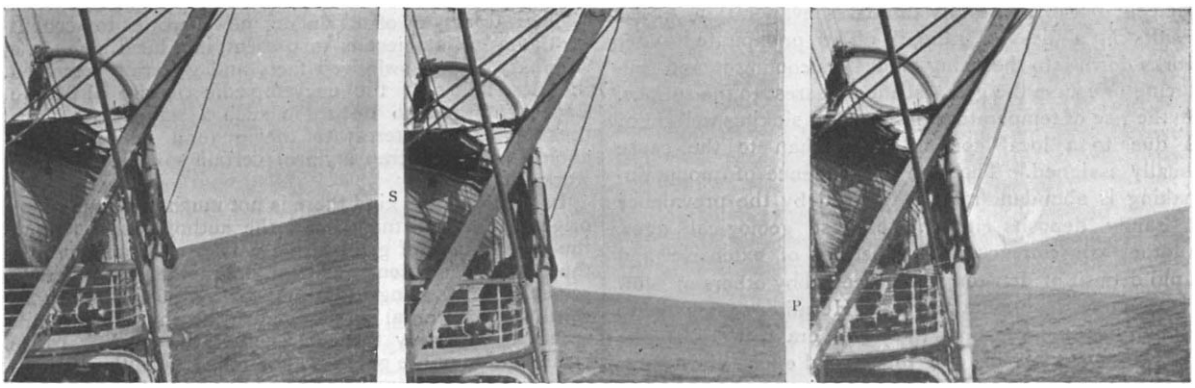
The second and larger half of the volume is devoted to Adams' papers on terrestrial magnetism edited by his brother, Prof. W. C. Adams. These consist chiefly in a determination of the Gaussian magnetic constants, a problem for which the material is even now scanty, owing to the fact that such magnetic observatories as there are, are for the most part closely grouped together in one portion of the earth's surface.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

The Rolling Angle of a Ship found by Photography.

WHILE crossing the Pacific Ocean between Auckland, N.Z., and Sydney, N.S.W., in the Union s.s. *Mokoia*, I wished to determine, if possible, the rolling angle of the ship by some means, other than that of the inclinometer, which the captain allowed me to inspect from time to time. As the period of rolling was long, it seemed quite possible that an ordinary kodak camera might be manipulated and a fresh film introduced, between the end of the roll to port and then to starboard. This turned out to be the case: the results are shown in the pictures A and B, which indicate the inclination of the ship to the horizon, to starboard and to port, respectively. The films when developed and finished were superposed, so that the pictures of the ship in each photograph coincided. The print made from this combination of the pictures B and A gives the composite picture C, in which the horizon in picture A is separated from that in picture B by the angle shown, which when measured with a circular protractor was found to be 19° 6′. After a few trials, no difficulty was experienced in making the exposure at the right time, viz., at the ends of a roll. Better results might have been obtained on dry plates, as films do not stand high temperatures well. The film B is very slightly distorted. The angle may also be found by means of a single picture; in this case a small stop should be used, and the exposure made for a longer period than that of one roll; the angle then appears as a rather faint fan, but the definition at the ends of the roll is not so well defined as when two pictures are made and then superposed.



Union Steamship Co.'s *Mokoia*. Rolling angle found by photography. A is a picture taken at the instant of the end of rolling to the right, S: B is a picture taken at the instant of the end of rolling to the left, P; C is a composite picture made by superposing the two films, A and B. The pictures of the ship are made to coincide, thus the angle between the two horizons in A and B is found. Lat. 34° 27′ S. Long. 157° 43′ E. To Sydney 325 miles.

Since my return to England, I find that M. Huet, of the French Navy, used a photographic method for indicating the rolling angle. But as his work on the subject is only in the hands of the French Naval Department, it cannot be consulted. His method is referred to in Sir W. White's "Manual of Naval Architecture." After obtaining the results shown in picture C, I devised an apparatus whereby the inclinometer angle may be simultaneously compared with that found by the photographic method. By this means, the positions of the inclinometer are also recorded on the films on which the horizon appears, so that the angle shown by the inclinometer may be at once compared with the angle found by the photographic method, which is entirely free from the errors inherent in pendulum inclinometers.

F. J. JERVIS-SMITH.

British Instruments at the Paris Exhibition.

IN connection with the English exhibits at the Paris Exhibition last year, it may be worth while to quote the concluding paragraph of this part of the impartial and very carefully con-

sidered report of Prof. Dufour, of Lausanne, the Swiss member of the jury.

"L'Angleterre vit, dans le domaine des instruments scientifiques, dans un isolement assez grand par rapport aux autres pays. Elle a ses habitudes et ses traditions, des instruments bien faits, mais ces constructeurs, ne paraissant guère se soucier de ce qui se fait hors de chez eux, ont peu d'influence sur l'étranger."

C. V. BOYS.

Notes on Minerals from the Lengenbach Binnenthal.

IN a recent visit to Binn I obtained some interesting minerals —viz. (1) a new mineral (2) Dufrenoysite, (3) Hyalophane.

(1) A new member of the sulpharsenites of lead, crystallising in the oblique system

$$\beta = 82°42\tfrac{2}{3}'. \quad a : b : c = 1{\cdot}36817 : 1 : {\cdot}947163.$$

Very similar to dufrenoysite in appearance, but distinguished by the rounding of the dome and pyramid planes and well-marked oblique symmetry.

I found an imperfect crystal three years ago, but it was not till last August that I obtained sufficient material to fully determine this new mineral.

(2) I also found some very finely developed crystals of dufrenoysite having fifteen new faces, also a twinned crystal, twin plane (0.1.14), thus resembling rathite, whose twin plane is (0.15.1).

(3) Hyalophane, the baryta felspar which is isomorphous with orthoclase, is now shown by some of my specimens to twin according to the Baveno and Manebach laws of twinning in orthoclase.

A full account of the above will appear in the next number of the *Mineralogical Journal*.

R. H. SOLLY.

Cambridge.

Gog and Magog.

YOUR interesting paragraph in NATURE of September 26 on the local Flemish giants carried annually in procession omitted the parallel most suggestive to English readers: Gog and Magog, cousins German of Gayant and Phinar, used also to figure annually in the Lord Mayor's Show, as is noted in Chambers's Encyclopædia. According to tradition "the Guildhall giants are images of the last two survivors of a race of giants who inhabited Albion, descendants of wicked demons and the thirty-three infamous daughters of the Emperor Diocletian, who, after murdering all their husbands, sailed to Albion. These giants Brute and his Trojans finally overcame, leading the last two survivors prisoners to London, where they were kept as porters at the palace-gate. This is Caxton's account; another represents one of the giants as Gogmagog, and the other as a British giant who killed him, named Corineus. These giants have stood in London since the days of Henry V., and have witnessed all its history since. The old giants were burned in the great fire, and the new ones, which are 14 feet high, were constructed in 1708. The ancient effigies, which were made of wicker-work and pasteboard, were carried through the streets in the Lord Mayor's Shows, and copies of the present giants were in the show of 1837. Formerly other towns in England and abroad had their giants, as the Antigonus of Antwerp, 40 feet in height, and Gayant, the giant of Douay, 22 feet in height."

D.P.

Edinburgh, October 3.

Fireball of September 14.

A VERY memorable meteor fell into the Atlantic on September 14, 1492, and is recorded in the diary of Columbus. It would be interesting to know whether his notes are sufficiently precise to enable one to say whether the radiant of that meteor is the same as that of more recent ones.

C. E. STROMEYER.

Lancefield, West Didsbury.

A New Name for an Ungulate.

IN a paper published in the *Geological Magazine* for September 1901 I described a large ungulate from the Eocene of the Fayûm, Egypt, under the name *Bradytherium grave*. I now find that the name *Bradytherium* had been employed a few months previously by G. Grandidier for a large extinct edentate from Madagascar (*Bull. Mus. d'Hist. Nat.*, Paris, 1901, p. 54), and I therefore wish to propose the name *Barytherium* for my genus.

CHAS. W. ANDREWS.

British Museum (Natural History), October 7.

ON THE MAGNETIC ROTATION OF LIGHT AND THE SECOND LAW OF THERMODYNAMICS.

IN a paper published sixteen years ago I drew attention to a peculiarity of the magnetic rotation of the plane of polarisation arising from the circumstance that the rotation is in the same absolute direction whichever way the light may be travelling. "A consequence remarkable from the theoretical point of view is the possibility of an arrangement by which the otherwise general optical law of reciprocity shall be violated. Consider, for example, a column of diamagnetic medium exposed to such a force that the rotation is 45°, and situated between two Nicols whose principal planes are inclined to one another at 45°. Under these circumstances light passing one way is completely stopped by the second Nicol, but light passing the other way is completely transmitted. A source of light at one point A would thus be visible at a second point B, when a source at B would be invisible at A; a state of things *at first sight*[1] inconsistent with the second law of thermodynamics." (*Phil. Trans.* 176, p. 343, 1885; *Scientific Papers*, vol. ii. p. 360). It is here implied that the inconsistency is apparent only, but I did not discuss it further.

In his excellent report ("Les Lois théoriques du Rayonnement, Rapports présentés au Congrès International de Physique," Paris, 1900, vol. ii. p. 29), W. Wien, considering the same experimental combination of Nicols and magnetised dielectric, arrives at a contrary conclusion. It may be well to quote his statement of the case. "La rotation magnétique du plan de polarisation constitue un cas exceptionnel digne de remarque, et l'on pourrait ici imaginer un dispositif qui mettrait en échec principe de Carnot s'il n'existait pas une compensation inconnue.

"Faisons, en effet, les suppositions suivantes; Deux corps de température égale sont entourés d'une enveloppe adiabatique. Les rayons qu'ils s'envoient réciproquement traversent deux prismes de nicol. Entre ces prismes se trouve une substance non absorbante sur laquelle agissent des forces magnétiques qui font tourner le plan de polarisation d'un angle déterminé. La radiation émanant du corps 1 pénètre dans le nicol 1. Nous supposerons que le rayon subissant la réflexion totale n'est pas absorbé, mais renvoyé dans sa propre direction par des miroirs convenablement disposés. Admettons que le plan de polarisation soit tourné de 45° par les forces magnétiques. La section principale du deuxième nicol étant orientée dans la direction parallèle au plan de polarisation du rayon émergent, toute la lumière transmise par la substance absorbante (*sic.*) traversera le nicol. Par consequent, la moitié des rayons émis par le corps 1 frappera le corps 2.

"Les rayons émis par le corps 2 se divisent en deux parties égales, dans le nicol 2. Une moitié est, comme précédemment, renvoyée par réflexion. L'autre moitié, après que son plan de polarisation a subi une rotation de 45° dans le même sens que le rayons émis par le corps 1, vient frapper le premier nicol. La section principale de ce nicol étant perpendiculaire au plan de polarisation, aucune radiation ne le traverse, et nous pouvons renvoyer toute la lumière au corps 2.

"Le corps 2 recoit ainsi trois fois plus d'énergie que le corps 1. [That is, 2 receives the whole of its own radiation and the half of that of 1, while 1 receives only the half of its own radiation.] L'un de ces corps s'échauffera par conséquent de plus en plus aux dépens de l'autre."

Wien then suggests certain ways of escape from this conclusion, but it appears to me that the difficulty itself depends upon an oversight. It is *not* possible to send back to 2 the whole of its radiation in the manner

[1] The italics are in the original. That magnetic rotation may interfere with the law of reciprocity had already been suggested by Helmholtz.